

Auxiliary Material Submission for Paper # 2012GC004373

Auxiliary material for this article contains four supplementary files including one text file and three figures regarding the assessment of analytical precision and accuracy of the dataset.

Paper: Isotopic Systematics of the Early Mauna Kea Shield Phase and Insight Into the
Deep Mantle Beneath the Pacific Ocean

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Appendix A: Analytical Precision and Accuracy

Precision of the HSDP2-B and -C isotopic dataset was assessed by the external reproducibility of replicate analyses of freshly prepared Pb, Sr and Nd standard solutions analyzed during the measurement sessions, and that of several sets of complete procedural duplicates and replicate analyses of the same sample solution (Table 1). Accuracy was evaluated by analysis of rock reference material solutions of known isotopic composition, such as BHVO-2 and Kil-93 (Table 1; *Weis et al.* [2005; 2006]).

The HSDP2-B and -C Pb and Nd isotopic results have also been compared to the values of *Blichert-Toft and Albarède* [2009] for the same samples (Figures A1 to A3). For accurate and direct comparison between the two datasets, the data from *Blichert-Toft and Albarède* [2009] was renormalized to the same accepted values of the NBS 981 and Rennes standard solutions used in this study [*Abouchami et al.*,

2000; Weis *et al.*, 2006]. The agreement between the two datasets is excellent for $^{206}\text{Pb}/^{204}\text{Pb}$ and for $^{208}\text{Pb}/^{204}\text{Pb}$, for which the linear correlations are ~ 0.97 . For $^{207}\text{Pb}/^{204}\text{Pb}$ and $^{143}\text{Nd}/^{144}\text{Nd}$, the agreement is not as close. Our values of $^{207}\text{Pb}/^{204}\text{Pb}$ and $^{143}\text{Nd}/^{144}\text{Nd}$ are systematically higher and lower, respectively, compared to those of *Blichert-Toft and Albarède* [2009]. Even so, the $^{143}\text{Nd}/^{144}\text{Nd}$ of both research groups are within error of each other (Figures A1 and A3). Our Nd isotopic compositions were obtained during two analytical sessions, one on the TIMS and the other on the MC-ICP-MS, and are in good agreement with each other. The Pb, Nd, and Sr isotopic compositions of BHVO-2 acquired during this study are in good agreement with the literature values for this reference material [e.g., *Woodhead and Hergt*, 2000; *Raczek et al.*, 2003; *Baker et al.*, 2004; *Weis et al.*, 2005; 2006; *Chauvel et al.*, 2010]. Given our careful sample treatment protocol prior to analysis, we have therefore no explanation for the differences between the two datasets.

Additional References in Appendix A: Analytical Precision and Accuracy

Baker, J., D. Peate, T. Waight, and C. Meysen (2004), Pb isotopic analysis of standards and samples using a ^{207}Pb - ^{204}Pb double spike and thallium to correct for mass bias with a double-focusing MC-ICP-MS, *Chem. Geol.*, *211*, 275–303.

Raczek, I., K. P. Jochum, and A. W. Hofmann (2003), Neodymium and Strontium Isotope Data for USGS Reference Materials BCR-1, BCR-2, BHVO-1, BHVO-2, AGV-1, AGV-2, GSP-1, GSP-2 and Eight MPI-DING Reference Glasses, *Geostand. Newsl.*, *27*(2), 173–179.

Woodhead, J. D., and J. M. Hergt (2000), Pb-isotope analysis of USGS reference materials, *Geostand. Newsl.*, *24*(1), 33–38.

Chauvel, C., S. Bureau, and C. Poggi (2010), Comprehensive Chemical and Isotopic Analyses of Basalt and Sediment Reference Materials, *Geostand. Geoanal. Res.*, 35(1), 125–143.

List of Figures of Auxiliary Material

Figure A1. Down-hole comparison of the Pb and Nd isotopic compositions determined in this study and by *Blichert-Toft and Albarède* [2009] for the same set of samples recovered during the HSDP2-B and -C. Analytical uncertainty (2 SE) is smaller than the symbol size except when shown by the error bars.

Figure A2. Binary diagrams comparing the Pb and Nd isotopic compositions determined in this study and by *Blichert-Toft and Albarède* [2009] for samples recovered during the HSDP2-B and -C. Slopes of unity are shown for reference.

Figure A3. Pb-Pb and Nd-Pb isotope diagrams comparing the isotopic compositions determined in this study and those by *Blichert-Toft and Albarède* [2009]. For reference, the compositions of USGS reference material BHVO-2 analyzed by *Weis et al.* [2005, 2006] and in this study are also shown.